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NPIC/TSG/RED-239-70  
1 October 1970

MEMORANDUM FOR: Deputy Chief, Research & Engineering Division, TSG

SUBJECT : Demonstration of a Photo Image Contrast Doubling Display Device

1. At 1400 hours on 29 September 1970 [redacted]

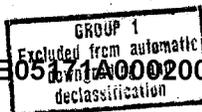
[redacted] demonstrated a breadboard device for producing a contrast doubling effect for viewing photo transparencies. Numerous members of TSG/RED and TSG/APSD were present. IEG sent one representative, TSG/ESD was invited but misunderstood the time.

2. The breadboard device consists of a collimated white light source filtered by a polarizer and projected at about a  $80^\circ$  angle onto a front surface mirror. A crossed polarizer is mounted in the path of the light reflected from the mirror so that most of the light does not pass through this polarizer and the illumination level appears to be low when viewing the mirror through the polarizer. When a piece of conventional clear estar film base is placed on top of the mirror the incident polarized light which is reflected off its surface is virtually invisible through the viewing polarizer, whereas the incident polarized illumination which passes through the estar film to the mirror and back through the film again is rotated about  $90^\circ$  thus making it plainly visible through the viewing polarizer. If there is imagery on the estar base film each of the various apparent densities of the image is theoretically doubled by this process which also results in doubling the apparent contrast. The effect is true for color as well as B&W transparencies. A contrast increase was readily apparent when viewing a number of samples of imagery on this breadboard. If the initial density was high then the increased density became too great and image details were lost; however, the effect appeared to be beneficial where the overall density and contrast were both low. In such cases an apparent increase in saturation of hue in color imagery was readily observed.

3. After the demonstration and general discussions, [redacted]

[redacted] and myself attempted to determine a logical approach to a more meaningful evaluation of this viewing system as far as its potential benefit to NPIC operations is concerned. We concluded that a relatively simple visual perception test should be designed, using [redacted] breadboard for the contrast doubling display and a conventional light table for comparison. If the effect could be demonstrated to significantly increase perceptibility in this case, then the development and fabrication of a more sophisticated viewing system--for instance,

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one utilizing a [ ] dynazoom or possibly a split field display--should be relatively easy to justify. On the other hand, since the investment will be quite modest in any case, (i.e. [ ] it might make more sense to go ahead and build a better viewing device and then make an evaluation that is more highly correlated to actual NPIC PI operations. Incidentally, this process may have some significant applicability in the mensuration area, since it appears to increase contrast and therefore should also cause an apparent increase in the edge gradient, thereby possibly improving the process of positioning the reticle on the image edge.

4. With this I leave it to you to decide what further course of action should be taken. I definitely believe this principle is worth a more thorough evaluation.

[ ]  
Special Assistant for Plans & Applications, RED

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